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Metropolitan Sewers.

REPORT TO THE WORKS COMMITTEE,

ON

JENNINGS' BUILDINGS, KENSINGTON, AND KENSINGTON WORKHOUSE.

February 7th, 1849.

ORDERED by this Committee, on the 30th ultimo: "That
" Mr GOTTO do confer with the Sewage Manure Company,
" with respect to the Drainage of Jennings' Buildings,
" Kensington, and Kensington Workhouse, and do report
" forthwith upon it."

I approach the subject of this Report with diffidence, from my previous local ignorance of the character, condition, and extent of the drainage of this district.

The drainage of Jennings' buildings is defective and irregular in construction, and has been a source of annoyance and complaint from as far back as the year 1664 to the present time. Originally an ancient open watercourse, crossing the High street, and discharging into lower sewers, it has from time to time been arched over, and now passes under several houses, from the High street into Jennings' buildings, is difficult of access, and calculated to accumulate deposit.

In 1839 the sewer was diverted round the block of houses of which Jennings' buildings form a part, along High street, Young street, and James' street, meeting the old sewer again opposite Charles street, whence it is connected with a new first-class sewer, five feet six inches high by three feet six inches wide, built by the Commissioners, and continued in 1847, by Robert Gunter, Esq., and the Kensington Board of Guardians, about 1,200 feet in length, and of about the same capacity, passing round the premises of the new workhouse, and thus effecting

another diversion of the old Kensington open sewer, which is now at that place filled up and abandoned.

This new length of sewer ends in Wright's lane, and discharges into the old open watercourse, the bed of which is above three feet *above* the invert of the new sewer. There is, therefore, an average depth of about three feet of soil (at least 500 loads) throughout its whole length, which renders useless the better half of the sewer, which, however, can be very well spared, as I consider the capacity to be at least four times larger than is necessary. This defect of outfall is moreover a source of great evil, since—contrary to principles already long established—the sewer is, in the first place, contrived (for an indefinite period) to contain deposit and become a cesspool; in the second place the sewage passes over the rugged uneven surface of the deposit, which consequently must and has gradually increased in accumulation.

A complaint was made upon this subject on the 26th May 1848, shortly after the sewer was constructed, by the Board of Guardians, who considered “it would be highly dangerous to the health of the poor to remove them in the present state of the sewer.”

Whereupon the surveyors report, on the 21st September, 1848, “that the new sewer stands full of foul water and deposit, the evils of which will be fearfully extended when the new workhouse is fully occupied, and propose to improve the outfall, but recommend that the work be deferred.”

On the 15th January, 1849, the guardians again complained “that there is offensive soil three feet six inches deep in the new sewer by the workhouse, which cannot escape, and that the said sewer is no better than a long cesspool.”

As far as I can learn, there is neither plan nor longitudinal section of this sewer in the office, but merely a pen and ink rough sketch accompanying the Petitions; I have, therefore, been unable to ascertain its inclination, and the more so as I had lost the services of the clerk of the works to this district, whose local knowledge I found to be of great assistance the first day of my investigation.

The drainage of Jennings' buildings is inseparably connected with, and depends for outfall upon, this new sewer, and upon examination lately made in consequence of the outbreak of the cholera, the gullies and drains in that neighbourhood were found to be nearly full of soil. This latter has been promptly remedied under the active superintendence of Mr Lovick; 800 feet of sewer and fourteen gullies in this district having been cleansed between the morning of Friday the 26th, and the afternoon of the 28th ultimo.

The Parish officers have carted away about twelve loads of night soil from cesspools, and have effected some cleansing of the street surfaces.

The proprietors have limewhited and coloured a great number of the houses, and have made some alterations in the cesspools, which last, however, can scarcely be said to be improvements. But the remainder of the sewer, as well as the drains, of the new workhouse are still half full of soil, and no permanent remedy can be

applied until a proper outfall is effected ; in the mean time the workhouse is scarcely habitable.

Such are the evils, and such the exertions used to stay the progress of the cholera, which has attached itself to this spot.

As the emergency of the case admitted of no delay, I urged upon the Board of Highway the necessity of further exertions on their part, suggesting that the streets, lanes, and alleys should be washed with an abundant supply of water, frequently applied with hose and jet, and referring to the powers conferred on them by the " Nuisances Removal Act."

Mr Lovick has given further directions to the men under his control for the more general emptying of cesspools.

Much more is to be done by the owners of property in systematic limewhiteing, and these temporary arrangements for present relief should be carried out simultaneously, immediately, and under efficient superintendence.

The following recommendations for the more permanent improvement of the drainage of Jennings' buildings have been considered with a due regard to drainage area, and may be accomplished without prejudice to any general system that may be proposed upon the completion of the ordnance survey.

I propose that the old line of sewer passing through the middle of Jennings' buildings, which is worse than useless, be filled up and abandoned, and that block of houses treated specially as dependent upon the new sewer in James' street, and glazed stone-ware pipes laid down, as shown in the accompanying plan ; the public necessaries to be constructed so as to answer the purpose, and act in a similar manner as flushing tanks at the head of the pipe drains.

The very filthy character of the crowded inhabitants in these houses, and the obvious impossibility of subjecting them to any order and regulation, renders this neighbourhood peculiarly adapted to the introduction of a plan of necessaries, as nearly as possible self-acting ; and notice should be served (as soon as the forms are prepared by the council), to construct such proper necessaries and drains, the expense to be paid by an improvement rate for twenty years. The occupiers of James' street not having complied with the notices served upon them to drain into the new sewer, should be compelled to do so under the present act, and Young street should be served with notices for the same purpose ; and as the committee must be aware of the indisposition of parties to incur the heavy charges of private builders (in the cases above described, about 8*l.* per house), and the advantage they would have, and the economy they would effect, if the work were done by the Commissioners' contractors, and paid for by an improvement of about 6*s.* per annum for each house, for twenty years, I therefore recommend that in these instances this system be introduced.

But as these arrangements would be of no avail, with the outfall in its present condition, too much importance, as before shown, cannot be attached to the immediate necessity for providing a complete relief at this point.

The result of my conference with the Sewage Manure Company has deter-

mined me in the selection of a line of temporary small sewer, to leave the choked end of the new workhouse sewer, on a level with its invert (with a head wall as high as the bottom of the bed of the open sewer, in order to allow the discharge of surplus water on extraordinary occasions of storms or heavy rains), and passing along Barrow's walk through Earle's court (affording an efficient drainage for the whole of that valuable property), thence down Walnut Tree walk, and along the Fulham road (with a favourable opportunity to drain that neighbourhood and St Mark's college, itself containing 1,100 persons), and so under the bed of the Kensington canal, at Stamford bridge (cutting off the connection of the Stamford villa sewer with the canal), and terminating at the company's works.

This proposed new line passes through the centre of the Counter's Creek district, and while it possesses peculiar advantages for receiving the house drainage of nearly the whole of this district, and effecting much improvement in the way of unity of arrangement, and in the collection of the very valuable concentrated sewage, it is also of sufficient depth, and otherwise very well adapted to meet the requirements of any new streets that may be erected in the neighbourhood.

And should it be deemed expedient at any time to cut off the connexion with the Sewage Manure Company's works, a communication of only 350 feet long may be made with the Little Chelsea Sewer (constructed in 1845), from the corner of Walnut-tree walk, in the Fulham road.

The length of this new temporary sewer would be 6,500 feet. Its size, two feet by one foot three inches of glazed stoneware pipes. Its cost, 1,950*l.*, at 6*s.* per foot, including digging, carting, and making good, but I am given to understand that earthenware pipes of this capacity can be procured and laid at about 1*s.* 6*d.* per foot, which would reduce the cost to 1,300*l.*, and I recommend this latter to the Committee.

I have conferred with the Metropolitan Sewage Manure Company, who propose to take the sewage of the Kensington sewer, and, if the Commissioners will at their cost lay down the necessary new sewer pipe, to pay interest at the rate of from five to eight per cent. upon the outlay. The sewer in such a case to belong to the Commissioners.

On the other hand, the company propose to pay the whole cost, of which 500*l.* should be immediately paid, and the balance by instalments extending over six months, with interest upon the unpaid balance.

The company do not, however, confine themselves even to these two propositions, but are open to any suggestions of the Commissioners, with which they express themselves willing to comply as far as their financial circumstances will admit.

They further solicit permission to include in the foregoing arrangement the construction of a sewer at Walham Green, to divert the Eel Brook Sewer, and connect it with that built in 1837 along the Stamford villas, and using the sewage of that district.



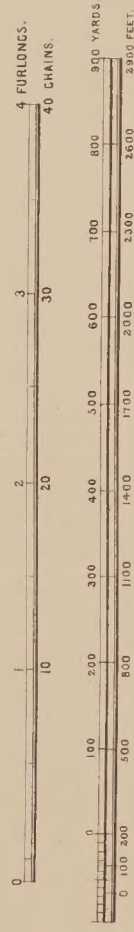
PLAN
 TO ACCOMPANY
SURVEYOR'S REPORTS
 ON THE
DRAINAGE OF JENNINGS'S BUILDINGS,
KENSINGTON, & KENSINGTON WORKHOUSE,

Dated 8th and 13th February,

1849.

SACLUVE, MACDONALD & MACGREGOR, LONDON.

S CALES.



E. G. Lott



There are no engineering difficulties in the way of granting this permission; the sewer is much required, and for all the purposes of conveying any body of water that can find its way into the sewer under any circumstances, a 16-inch earthenware pipe would be sufficient, the length being 1,500 feet, the cost would be about 242*l.* (allowing 2*s.* 6½*d.* for digging and carting, &c., and 9*d.* per foot for pipes and laying); but should the Commissioners, for uniformity sake, desire to bring up a sewer of the same capacity as the Stamford villa sewer, namely, two feet three inches by three feet nine inches, its cost would be 525*l.* I recommend the cheaper plan.

The first proposal of the company to take, as it were, a short lease of the sewage, appears to me the more advantageous to the Commissioners, because it could be easily managed to raise the rent, if the company were supplied with an additional quantity of sewage, through the introduction of other sewers into this line; or, if the circumstances of the case required at any time such a step, putting an end to the lease altogether. It should be borne in mind that the return to the Commissioners from the charges of frontage would, in the first year or two, probably cover the whole outlay, for a considerable length of the sewer passes through much property already built upon, and wholly without drainage.

The second proposal of the company to construct the work themselves would of course give them a right over the sewers, and the charge for frontage, which would involve some difficulty in the event of any alteration of system being hereafter required. On these grounds it would appear that the former offer should be entertained.

The company are anxious that no delay may take place in completing any arrangement that may be proposed, as they anticipate some present advantage from the prospect of distributing the sewage in the month of May next.

The alarming spread of the cholera in the last few days also induces the necessity, upon public grounds, of a speedy decision on the point.

I have entered thus far into detail because my report deals with the most important sewer of the Counter's Creek district, already extending to the town of Kensington and Kensington Gravel-pits, and embracing an area of about 220 acres, and contemplating a competent provision for a further extent of about 360 acres of valuable undrained property; and I regret that the indisposition of Mr Austin has precluded me from consulting him on the subject; I now beg to submit the summary of my recommendations:—

1st. That with respect to Jennings' buildings, the parish officers be requested to exercise the powers conferred on them by the "Nuisances Removal Act," in emptying cesspools, and cleansing with water, frequently and abundantly applied with jets and hose. That the owners be requested to complete the lime-whiting, and that a clerk of the works be temporarily appointed to watch this district during the absence of Mr Perkins.

2ndly. That the old sewers in and about Jennings' buildings be filled up and

abandoned, and that block of houses drained into the Young street sewer in the manner shown on the plan, and described above, and that the expense be levied by an improvement rate.

3rdly. That as soon as the forms of notices are prepared by the council, the inhabitants of Young street and James' street be served with notices to drain into the sewers in those streets, and that the system of improvement rate for twenty years be introduced.

4thly. That the Commissioners at their own cost, 1,300*l.*, do lay down a pipe sewer, from the end of the new sewer, in Wright's lane, to Stamford bridge, and another pipe sewer from the Eel Brook to the Stamford villa sewer, at Walham green, in the manner described in this report, and that the offer of the Metropolitan Sewage Manure Company to pay by way of yearly rent for the sewage proposed to pass through these sewers, a sum equivalent to eight per cent. upon the outlay, be accepted, with the understanding that the company, at their own cost, will effect the connection of these sewers with their works under the inspection of the officers of the court. And that an agreement be entered into, determinable, as may seem fit, by the Commissioners.

EDWARD GOTTO,
Assistant Surveyor.

Mr Gotto's Second Report on the Drainage of Jennings' Buildings, Kensington, and on Kensington Workhouse.

TO THE WORKS' COMMITTEE.

*No. 1 Greek street,
February 13th, 1849.*

Part of my report presented on the 7th inst. having been referred back to me for an opportunity "to re-consider and report upon the connexion of the Kensington sewer, at South End, with the sewers recently built in the upper portion of the line; and as to the further extension of the line," I examined the sewers in Church street, Holland street, Duke's place, and Wiple place, constructed in the latter part of 1845, and considered their connexion with the sewer built in 1847 round the new workhouse.

The first proposition in the order above quoted is, whether this latter sewer is not much larger than necessary to carry off the drainage of that part of the district with which it is connected, as stated in my former report. Sensible that the question involves a principle of the highest moment, in reference to future and extensive contemplated works, it should be freely discussed; and in order to this, I thus early endeavour to relieve the minds of some of the Commissioners from the unfavourable

impression towards Mr Phillips, which I perceived that part of my report had created. Previous to that work being commenced, he explained to the Court, on 23rd January, 1847, "that until the outlet is deepened all along its course, to its junction with the Counter's Creek main sewer in Warwick road, or until an entirely new main sewer is made, and carried southward, through the middle of the district, to the Thames, to discharge itself under low water mark, the bottom of the proposed sewer of the petitioners will (as I stated to the Court when the petitions were granted at its last meeting) be about three feet below the ordinary surface of the water flowing in the present open sewer." And I am given to understand that under the Old Westminster Commission Mr Phillips was compelled to recognise works which he believed to be inefficient, and contrary to the principles he so ably maintained before the Sanitary Commissioners; and as it is upon such principles, I then stated, and now maintain, that the sewer in question is four times larger than necessary, I do not fear I shall be expressing views at variance with those entertained by Mr Phillips, but on the contrary, the establishment of this point will be to the prejudice of the system by which he was controlled.

The extent of area drained by this sewer is delineated on the accompanying plan by a red tint, and embraces about forty-seven acres of town land, and 163 acres of uncovered land; it contains at present about 1,100 houses. The whole of the sewage from which, together with spring water, is about 21,116 gallons in an hour, and occupies in the sewer a sectional area of .938 of a superficial foot, and would, with the accelerated velocity acquired by concentrating the force of the water, now passing over a flat uneven surface, in a smooth pipe, be amply provided for by a 10-inch pipe. The house drainage, therefore, occupies a very inconsiderable portion of the required capacity, and could be calculated, in most cases, with some degree of accuracy in an impermeable system. Not so, however, with respect to rain water; almost everything is complex and uncertain. The precise influence of change of inclination, the confluence of a number of streams, and the effect of gravity upon velocity and volume, are still undetermined, as well as the amount of friction due to the several parts of channels of various forms, upon which alone, apart from experiment, an accurate opinion can be formed. Laying aside, therefore, all existing formulæ prepared upon private theories as having been proved in most instances erroneous, and altogether not to be depended on, I based my opinion upon the practical results of Mr John Roe's valuable experiments. The case that approaches nearest (by way of comparison to that under consideration) is that stated in his evidence before the Sanitary Commissioners in 1847. During the great storm of August 1846, the water from 215 acres of town land, and 1,785 acres of uncovered or rural district, occupied only thirty and a half feet of the superficial area of a sewer, with an inclination of one in 240. There are 47 acres of town area, and 163 acres of uncovered area in this case, and the general inclination of the sewer is the same as that mentioned above, which makes on the whole about one-sixth of the capacity in the former case; that is, about five superficial feet.

Now twice as much water fell in one hour on that occasion as has ever been known to be the case in the memory of man ; and it is an opinion expressed by Mr Austin (p. 324, *First Sanitary Report*), and very properly, as well as generally received, that we should not calculate upon storms of such very extraordinary nature in determining the size of our sewers ; and therefore I then stated, and still think, that a sewer of $3\frac{3}{4}$ superficial feet capacity, would be sufficient if it had a clear outlet, which might have been the case under those circumstances, as the expense of building the last 1,200 feet would have been sufficient to carry that smaller sewer the whole distance to the Counter's Creek main sewer, and have prevented the present stoppage and inconvenience.

In Mr Phillips' report before alluded to, and since, he states that he has seen the sewer at South End, before the last 1,394 feet were built, three parts filled with water during a very heavy storm. I can only attribute this to an impediment in the outlet, irregularity of construction, and its flat bottom ; for, calculating upon a fall of rain of two inches in one hour upon the district shown on the plan, and under these circumstances, there would be about 1,433,500 gallons find its way in one hour into the sewer. But supposing the sewer three parts full, with its present fall there would pass through it a quantity of water equal to 5,197,500 gallons in an hour ; that is, 3.61 times as much as fell, or as would occupy that large part of the sectional area of the sewer ; namely, eleven super feet ; and this brings us back again to corroborate my statement ; for 11 divided by 3.61 will give the required capacity of little more than three feet. The area of the sewer I suggested was 3.625 feet.

And now in reference to the farther extension of the line. I have reconsidered that point, and am of opinion that none better can be selected than that proposed in my former report ; namely, through Earle's court into the Little Chelsea road towards Stamford bridge. I am confirmed in this view by Mr Phillips' opinion, who, it appears, pointed out this direction some time back. Mr Donaldson considers that the land would be improved 1*l.* an acre per annum, and requires draining as much as any in the vicinity of the metropolis.

The pipe proposed in my former report was intended to carry only the ordinary flow of sewage, and I had provided an overflow into the open sewer at Wright's lane for extraordinary falls of rain. The object aimed at was temporary relief to the district at present suffering from the loaded state of the sewer, and upon the consideration that the Sewage Manure Company paid the cost, which they proposed to do.

I have visited the patent kilns at Alpurton, and am assured that the pipes can be laid down for the sum I before stated ; namely, one shilling per foot for pipe, carriage, laying, which, together with the digging, burning, &c., would amount to 1,300*l.*

EDWARD GOTTO,
Assistant Surveyor.